PYROTECHNICS

THE NOW & THEN NEWSLETTER OF GENERAL TECHNICS

PERPETRATED LARGELY BY
JEFF DUNTEMANN
& CAROL DUNTEMANN

NO. 11 FEBRUARY 1978

GENERAL TECHNICS

CLOSE ENCOUNTERS OF THE WORST KIND

I have a hunch I'm being tagged as The Man Who Hates CETK. That's not true; the movie entertained me, and I cannot hate any artistic work which entertains me. Still, there were things about that flick that griped the hell out of me, and this may be a good time and place to talk about them.

First of all, the movie is self-indulgent as hell. Spielberg made Jaws, so he can do what he wants, right? He certainly thinks so. The film leaves all obligations to plot behind, and jumps from non sequitur to non sequitur like fleas in a pack of dogs. I write science fiction, and I could never get away with such sloppy plotting as that, simply because I have no Jaws under my belt. Fooey.

Specific nits later. What spoils the whole damned film for me is the simple fact that the aliens do not speak. Nothing. Not even a word of Alienish, much less English or Pig Latin. They seem to understand human culture sufficiently to transmit earth coordinates in hours, minutes, seconds, and degrees. They have held "guests" at least since 1945, and probably a lot longer. Even I could learn a foreign language in that time, and simple Spanish stymied me in college. They understand sound all right, as anyone who has been shaken by the sound system in the Old Orchard Theater will attest. They're humanoid, fer crine out loud! They have mouths that can smile, and I'm expected to believe those same mouths can't speak. Not even a "We powerful creatures from beyond sky; we friends!" No. They do understand standard Earth deaf-and-dumb sign language, however; maybe they went deaf from listening to their own movie. I almost did.

That little exploratory interchange of the "five note sequence" was stirring and dramatic, and totally pointless. If they had doubts about our intellegence, the very fact that we interpreted their coordinates and found their landing site should have convinced them. Instead of coming down their ganplank and saying, "Hi, folks, how are you?" they treat us to a rehash of "Dueling Tubas." It was pretty, yes, but I didn't buy it.

Who was Big Boss of the Secret Project? Lacombe? Sure doesn't assert himself much. Nor did I believe that nerve gas subtrefuge. The army is in enough deep shit about CBW weapons getting loose without creating any false alarms. How did the Project know the saucer was going to drop off passengers? Or pick new ones up? Where did that panel full of people's pictures come from? Things like that. But those are mere directorial booboos. There are more important questions.

What are they coming down here for? What are they up to? Why did they invite Jillian's son to come aboard? They play jokes on people. Is that all we are to them? A new audience for cosmic hijinks involving the Ohio State Turnpike? Why all this silly-ass farting around? Why in the name of God don't they just come down and talk to us?

Ahhhhhhhhhh. Now we come close. God. Mystery. Enigma. We cannot speak to the aliens, or it would destroy their feeling of enigma. It would destroy their mystery. They are so far ahead of us that they must be unknowable, incomprehensible.

Bullshit. Broiled, fried, baked, freeze-dried well-seasoned bullshit. There is only one difference between those aliens and us. Technology. They are organic creatures who rose from unliving organic slime, just as we did. They just did it a couple hundred thousand years sooner is all. Someday we may well drape our starships with Italian lights and go scare the crap out of the poor aborigines struggling to control nuclear power on Tau Ceti IV. That doesn't mean we'll be gods. Or even angels. We'll just be better techies.

I didn't hate the movie. But I'll tell you what I do hate: Mystery. Unknowableness. Enigma. Superstition. All that is fine in a Tolkien fantasy or tales of our past. I can't stomach defiling the future with it. When we meet our first advanced civilization, I will be awed. But only for awhile. After the first hour and a half, I will want answers. Like what black holes are. How to control gravity. How to travel faster than light. If they pull the old Some Things Man Was Not Meant To Know schtick on us, I will turn my back on them. When I want to worship God I will go to church. I will not bend the knee to a little green man.

Right there lies the key to CETK's appeal. It presents a God to be worshipped for those who cannot accept our conventional gods. A lot of SF fans, I suspect, will like the movie for that same reason. Contemporary religions make them barf, yet they still have that urge to look to some higher, unknowable force that is behind the workings of the universe. Since Jesus Christ seems silly to them, they will worship saucer men. Wow.

Some people have never realized that religion seldom has anything to do with God. They can't seem to separate any idea of God from an image of a man in a sheet with a long white beard who tosses sinners in a giant barbecue pit. Talk about failure of imagination! To replace that grotesque with God riding in a multicolored flying saucer...modern, but just as dumb. Did you see Oh God! ? God appears to John Denver as George Burns because if God had appeared as God Denver's mind would have cracked open like an overripe grapefruit. That makes sense to me. Anything which is truly unknowable cannot even begin to be shown on a medium as explicit as film. Furthermore, anything which is truly unknowable would have to be God, by default. Think about it for awhile.

God does not drive a flying saucer. He has a little more imagination than that.

On the other hand, it made me laugh. Techies rolling a giant globe down the hall. UFO's running a toll plaza on the Ohio Turnpike. In parts it took my breath away. The UFO's were gorgeous. I certainly got my money's worth. But don't you think that George Lucas got a little bit more for his ten million bucks than Spielberg got for twenty?

Don't get the wrong idea. I don't have a closed mind about this; I always sound that way. Let's talk about it!

GENERAL TECHNICS is an organization of fannish techies (and not techish fannies, as some wiseass reported) who share data, resources, and experienc in pursuit of a good time and occasional profit. The group meets mainly at cons, hamfests, and private Berserker Weekends.

MEMBERSHIP is terribly difficult to obtain. You must somehow scrape up a number of 13¢ stamps, and then at great effort write a letter explaining what your qualifications as a techie are to

Jeff Duntemann
6424 N. Albany Avenue
Chicago Illinois, 60645

including those stamps. If the above person can read your handwriting you are an

APPRENTICE TECHIE and entitled to call yourself a member of General Technics. You will also receive

PYROTECHNICS until your stamps run out. Renewal of membership is synonymous with sending more stamps. If you decide to quit, we will use one of your stamps to send the rest back to you. If you're nuts enough to want to become a

SECRET MASTER UV TECHNOLOGY (SMUT) you had better talk to

Tullio Proni
1309 Wells Place
Kalamazoo Michigan, 49001

because I don't have anything to do with it.

ANYTHING ELSE, ask me. I may not know but I'll tell you anyway.

GIGO

FROM TOLLIVER--"These are the voyages of the starship Tom Swift...the first steam-powered spacecraft..." [No, I haven't been sniffing toner solvent. It's just that my brain has little to do these days and sometimes wanders around without a leash. And it isn't house broken either...eyucch!]

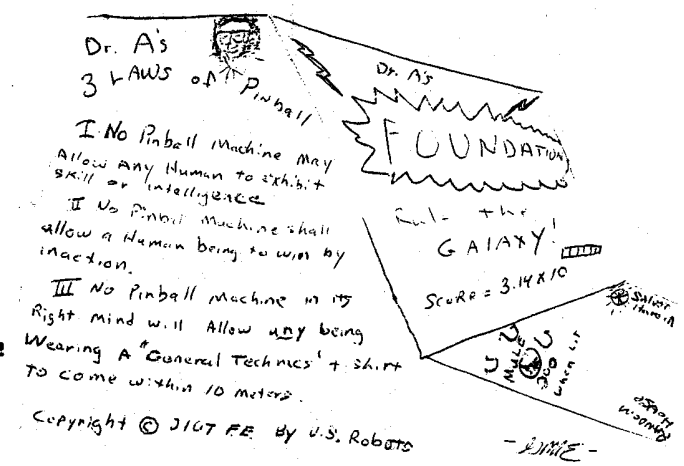
What I came up with is a reaction drive ship that uses a low-mass parabolic reflector to heat water up to superheated steam and use this high-pressure substance as reaction mass. A backup reactor is used for operation in planetary shadow. Now, then. Has this been thought of by any other renegade from a basket shop?

(Sounds damned familiar somehow, Jeff, but I can't quite put a finger on it. Using solar power to energize reaction mass is a good idea. From Earth's orbit inward you could get along with a good sturdy aluminum or magnesium reflector forty or fifty meters across and build up a helluva head of steam. Further out you'd need more reflector area. The problem with superthin .001 mil mylar mirrors is that they're hard to haul around with you. Building up acceleration with sunlight evenly distributed across the reflector surface works well up to accelerations of a few hundredths of a gravity. Your Swiftship would have to pull or push a rather insubstantial mirror around at much greater accelerations to make the whole thing worthwhile. How is that done without deforming the parabola enough to move the focal point away from the boiler...to the crew compartment, maybe? What you might have to do is stop acceleration, unfurl mirror, build up a head of steam, furl mirror, and move off again. Give it some more thought, and sketch something out--the idea is intriguing as hell.)

FROM JANE ELLEN OLSEN--When I saw Tullio at ConFusion last month, he said that he had been getting notes from you asking "Who the heck is Jane Olsen?" and that I should drop you a line to let you know that I actually exist. I do exist and would appreciate being included on the membership list. I admit I feel somewhat like an invisible person, having been left off the last two lists. I get some strange looks from other members at cons when I claim to have been a member for six months or so--well, maybe I'd get them anyway, but...

Tullio said when he got his pictures back he'd ship you a snap of me--in full con regalia. I'm also a charcter member of the guardians of the Red Gate, which you've probably never heard of, but we have a lot of run at cons running around in red outfits, serving wine, and talking to lots of people. Aside from that I'm a 34 year old housewife (no comments about being old enough to know better than to be a techie, please) who's trying to learn electronics. This project would have gotten nowhere fast if Tom Devlin had not been helping me. However, I think he gets upset with me because I have several other projects going, and I'm not studying as hard as I should. I have a fairly busy custom knit and crochet business going. I make sweaters, vests, dresses, etc. to measure and am experimenting with my own designs. I'm also the assistant editor of a small ecology oriented magazine, DOING MORE WITH LESS, that comes out six times a year. And somewhere around all that, I have to sandwich a voracious appetite (Good wordplay there--Ed.) for reading, and the usual cooking, cleaning, laundry, etc. But one of these days I'm going to get all the basics down, I hope. Tom does a lot of work with digital logic so he's been teaching me that too. It's all starting to make sense, but I'm still pretty unsure of myself. I keep blowing transistors into a number of smaller sections.

(Well, Jane, you have my apologies, and if I ever meet you may exact what vengeance you wish. A great deal of my PyroTechnics operation is computerized (otherwise it would be utterly impossible) and somehow I never checked the last two membership printouts against the master filebox. You must be very slender; somehow you slipped through the cracks. Never again. No one I had ever spoken to could remember having met you, hence my despairing plea for information leading to the arresting conviction that you are in fact alive in the flesh somewhere in the USA. I am aghast at the sheer energy apparent in your daily itinerary, since rumor also has it that you have one or several children. I can barely handle a wife, an apartment, and a robot. Don't fret the transistors. You may have heard of Gus Flassig's Plastic Emitting Diodes, small junction devices which under the stimulation of several amps of current from a gel cell (without limiting resistor) emit a brief burst of red plastic. Unfortunately they are good for only one cycle of operation. Sigh.)


Dr. A's
3 LAWS of Pinball
I. No Pinball Machine May Allow Any Human to exhibit skill or intelligence
II No Pinball Machine shall allow a Human being to win by inaction.
III No Pinball Machine in its Right Mind will Allow any being Wearing A "General Technics" t-shirt To come within 10 meters.
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Dr. A's
FOUNDATION
GALAXY
SCORE = 3.14 X 10
-JIMIE-

FRANK W. DUNTEMANN
1922 - 1978

My old man was an engineer. Let me tell you about him.

He was the son of a banker, who defied his father and left accounting school to become an engineer. He couldn't see spending the rest of his life counting other people's money. During WWII he tended a weather station in the Sahara and raised mongrel dogs.

After the War he married a young nurse of Polish extraction, bought a house in Chicago, and continued raising mongrel dogs. He was a field engineer for the Gas Company, acting as roving troubleshooter and advisor to the biggest industrial users of natural gas on the North Side. He singlehandedly ironed the wrinkles out of the heating and air conditioning installations in a little city project called O'Hare Field.

He loved his work, and did it exceedingly well. Plant managers would thank him for his help, and offer him whatever favor they could in return. "All I want," he told them, "is to bring my kid in here and show him around."

So he hoisted his four-year-old son up by the armpits to let him peer down the fiery throat of a gas- fired brick kiln, and watch endless rows of moist clay blocks march on belts into the flames. In the son's eyes was terror, but also a growing fascination which would never fade.

He followed his seven-year-old son down iron steps into the clammy vastness of an enormous storage tank in a North Side pumping station, full of a hundred thousand gallons of raw lake water, all green and flecked with algae. "Twenty minutes from now," said the station manager who was giving the private tour, "people will be drinking this stuff. And it'll be as clear as clean glass."

With his eight-year-old son he watched a huge vat of molten chocolate become Power House candy bars. With his nine-year-old son he watched workmen tap a gas-fired crucible and turn a fiery stream of red-hot glass into precision chemical glassware. He walked with his ten-year- old son through a gigantic airport boiler plant, amidst a jungle of pipes and cables and ducts. "Machinery is neat, isn't it?" he asked his son.

His son nodded.

With his son at his elbow, he turned a boxful of fragile balsa wood and thin tissue paper into a graceful model airplane with a forty-inch wingspan, and stopped every so often to explain how a wing worked and why the tail was shaped the way it was. And then out on a grassy field his big hand released the plane, with its big wooden propeller turning almost slowly at the urging of the rubber band in its belly. In utter silence and slow majesty, the plane flew eight feet above the ground for a quarter of a mile, and landed light as a feather without a scratch. His son couldn't believe such a big, fragile thing could fly. His voice was confident as they walked to retrieve the plane. "When you build 'em right, they fly."

He had definite ideas about school. "English is the most important subject you'll ever study," he told his eleven-year-old son. "If you can't speak and write intelligently, you'll be an ignorant slob for the rest of your life." After English came math. "If you know English and math, you already know everything else. You just have to read the books and work the problems. Nobody ever teaches you anything. You teach yourself."

And for all that, he put no pressure on his son to choose a career. "You decide what you want to be. Just let me know what, and I'll help you the best I can."

Sons grow up. Sons of unusual men tend to be unusual. They tend to be teased, taunted, and called "nurd," and "weirdo." He handed his twelve-year-old son a Kleenex and grinned. "If they call you names, ignore them. If they laugh at you, laugh too. Life demands a sense of humor. If they insist that you fight them, tell them you think it's a waste of time. But if they ever corner you, hit the SOBs where it hurts."

The very worst hurts can't always be laughed at, ignored, or fought. His fourteen-year-old son hesitantly asked him how to cope with girls. It wasn't easy when one was growing, awkward, and bearing the heavy burden of being "different." "Be polite and respectful when you don't know them," he said. "Keep your sense of humor, but keep it low-key. Later on, be gentle, and helpful, and patient. Tell them they're beautiful, especially if they're not. Listen to them when they talk, cuddle them when they cry. Do your damndest to be a good friend. Love comes out of friendship. If you're lucky and smart you'll marry your best friend."

He was right. And I did.

The lesson that comes back most clearly was from much earlier, while he was explaining to me what a flame is. We had a candle on the kitchen table, and he was generating carbon dioxide with vinegar and baking soda, and "pouring" it out of a measuring cup onto the flame. Like magic, it would shrink, and dim, and wink out. We did this a few times, and he got thoughtful. "Life is a little like the flame," he said. "You can torment it and smother it until it just goes out. But once it's out, you can never light it up again. Respect anything that's alive. If you have to kill something, kill it cleanly. But better still, use your head and try and figure out a way to co-exist."

How sad to think that this kindest of men was killed, anything but cleanly, by that cruelest of diseases, cancer. He was tough, and it took ten years, but finally his flame winked out under the pressure of unbearable pain.

His name was Frank W. Duntemann. He lived fifty-six years. He loved his wife, his children, machinery, engineering, model airplanes, HO trains, and an endless succession of lop-eared mongrel dogs. I write him this memorial because it's all he's gonna get. May it be worthy of his memory.

My old man was a hell of an engineer. Out of a handful of love and common sense, he made me. Thanks, Dad, and farewell.

MEET THE Z-80

BY BILL COLSHER

I was a mild mannered programmer for a great metropolitan bank (in Cincinnati) quietly writing COBOL print programs (when not maintaining COBOL print programs) when it happened. It was late in 1975, to be exact, when I learned that for a small sum (Ha!--Ed.) I could have my very own computer. The only catch was that it would come as a bunch of parts which I would have to put together and make work. I consulted a friend about this kit business and was reasured that, yes, it is indeed fun and easy to build kits. This friend was a veteran of virtually every Heathkit ever put out. I was soon to learn that computer kits were not exactly Heathkit Fish Locators.

After much research (there were lots of ads) I decided that the machine for me was the Digital Group Z80. The main reason was that the only computer store in Cincinnati carried that brand and the guy (Gary Shell, the store MicroWorks) actually had a system up and running with useful applications like billing systems and accounts receivable (remember I worked at a bank.) I got a loan from the bank and put in my order.

Since I didn't know anything about electronics or integrated circuits, I asked Gary for a book or two. He recommended Lancaster's TTL Cookbook. While waiting for the system to arrive, I learned that you should regulate power at the board level and use all the bypass caps that you can put your hands on. (Gary Shell aparently neglected to tell Bill that most uP circuits are not TTL. Alas for the bypass cap manufacturers.--Ed.) After two months, the system arrived.

I started with the I/O card since that had the fewest parts. Remembering that I should use as little solder as possible, I cautiously put iron and solder to a pin. Suddenly a huge gob of molten solder appeared on the pin. Strangely, it stayed there. Later I learned that they put some kind of goo on the board to keep the solder where you want it. I eventually finished the board and took it to MicroWorks to test it. To my surprise, it worked. The TV/Casette board went the same way. None of the boards had regulators since that is all done by the power supply. Gary assured me that the 12 amp supply would hold up just fine.

On to the memory board. Ick, there were 64 2102 chips for a total of over 1000 pins to solder; it looked like a great big pain in the bus. Eventually it got done. But what's this? Only five itty bitty bypasscaops for all those ICs? I recall that the blessed archangel of electronics Lancaster has said in His Holy Book something to the effect that "one .01 mfd disk for every two MSI packages." Assuming that a 2102 qualifies as MSI (But not TTL MSI!--Ed.) that leaves me 27 caps short. Doc Sudling said otherwise, so after a brief prayer to St. Lancaster, I moved on and eventually finished everything.

Gary said that the instructions aren't bad if you know what you're doing, but since I didn't, I just built carefully, and it worked. For the same reason, I didn't learn very much except how to solder. Hopefully something will rub off from you master techies. (Be careful, you might catch my dandruff--Ed.)

Programming, or so I thought, wouldn't be a problem for a computer science major like me. I didn't count on a lack of an operating system to run peripherals like the VS1 does. Fortunately, a small monitor (about 1.5k) is included along with a bunch of other neat programs. There's one that displays the American Flag while playing the Star Spangled Banner over a nearby transistor radio. There's also a couple of ham demos, and a game called Brain Teaser which is quite good. I soon tired of saluting the flag and decided it was time for some real programming. I loaded Tiny Basic and entered a program from one of the books. I soon learned that Tiny Basic is not OS/360 CPS. After about two hours of changes, Lunar Lander was up and running. I soon developed a bunch of Tiny Basic games, some of which will begin appearing in Kilobaud pretty soon. Tiring of the limited capability of Tiny Basic, I ordered an assembler and something called Maxi-Basic from D.G.S.S. at the Cleveland MACC. Two months later it arrived.

With the help of the assembler I wrote a version of the arcade game called Asteroid. Graphics without graphics isn't always easy, but it worked out well all things considered. Maxi-Basic came with a whole eight pages of documentation, so it isn't exactly the easiest program in the world to use. It does work and doesn't seem to have any major bugs.

Now comes the part you've all been waiting for: What I think of the Z80. Most folks seem to talk a lot about the speed of this chip. (Ho-hum. My COSMAC can run at 6 Mhz. But I do envy that Block Search instruction...) Since I've never had any other micro, I couldn't really say about that factor. What I will tell you about is programming it. You've probably heard about the block move and I/O instructions and how they're pretty neat. The Block Move is real handy for scrolling. There's another block-type instruction called Block Search. This guy will search any contiguous piece of memory up to 65k for any given byte. I'm hoping that this one will come in handy in my entry in the Byte Great APL Interpreter contest. You can scan an input line for some control character or operator with just a couple of instructions. (There's some initialization to do.) Another set of instructions that are hardly ever mentioned but are real memory savers are the Bit instructions. There are three types of these: SET, RESET, and TEST. With them you have bit level addressing for any memory location. Interpreters of any kind are loaded with true/false flags, so these instructions should be useful too. Even the 370 doesn't have them. A group of instructions that the 370 does have are the shifts and rotates. The Z80 implements them in a super way: You can use memory locations as well as just registers; the 8080 allows only the accumulator to be rotated and has no shift instruction. It works with all the registers in the Z80.

Getting away from the instruction set, we see that the Z80 has 22 registers. There are two sets of 8 which include the accumulator and flag registers in each as well as six general purpose registers. You can't really use all 22 registers at the same time. There is a swap instruction that lets you switch between the two sets. There are also two index registers that are very handy for all sorts of things, as well as a memory refresh register. This last registers is really for the use of dynamic memory, but it is a natural for generating random numbers. Since the register is updated at each instruction fetch, and most input routines for keyboards loop until a key is pressed, you get real random numbers. (I've got one more place to send my article on this and if they won't take it I'll print it in PT.) (Right on!--Ed.)

The Z80, of course, runs faster than the 8080. There is also a speed advantage that most people seem to be overlooking: for many of the 8080 compatible instructions, the Z80 uses 1 less clock cycle. For example, a register-to-register move takes 5 cycles in the 8080 and 4 in the Z80. (Those are clock cycles, by the way.) You do get burned a little on some of the really neat Z80 instructions. Indexed instructions can take as many as 23 clock cycles, with 19 required for most of them.

All in all, the Z80 is a pretty neat chip, but it could be better. Everybody should know by now that all 8080 software will not run on the Z80 because of the way the Z80 sets certain flags. There are some op codes which are two bytes long which causes some slowdown, but that's the price you pay for all those bit-oriented and rotate and shift instructions.

My impressions of Digital Group are so-so. Delivery is very erratic. I got my whole system in about two months, but other people who ordered about the same time waited as much as six months for the whole thing to come in. They are way behind in cabinet deliveries, especially for the CPU. I ordered one in June and four months later learned that they were just getting around to delivering April's orders. I cancelled and got one at Itty Bitty Machine in Evanston. Their stuff is worth the wait, however. The PC boards are superb, with no user changes needed and jumpers only for addressing memory start locations. Every chip has a socket, even to the last lowly 7404. There were two resistor packs missing from the system when it came, but a letter to DG got new ones in about a week, pretty good for the USPS these days. The casette interface is quite reliable, but since I've moved to Chicago, the "write" portion has been a little out of whack. Maybe one of you guys will loan me a frequency counter so I can get it back in tune.

I'm pretty happy with my system. The next one will be an LSI-11 from Heath but I'll definitely keep this one.

ZAPS
FROM THE BACKWOODS
DE GEORGE EWING

Media notes: Jotted beardmutterings and mumblesheet notes on films seen recently...

Starwarski: the ultimate in RPN space opera. I'm not going to say anything snotty about Lucas Skyfilmer's epicopus, honest, I'm not. Really. For that, you'll have to see"Starwarsky &Krultch," a picture parody submitted separately to yon Ed. (Just maybe--the pictures aren't reproducing too hot in test runs. Arrgh.--Ed.) So far, amazingly, the emphasis has all been on the goshwow stuff, and nobody has mentioned the fact that the movie is in fact one of the funniest damn satires ever seen. Imagine if Dark Star had had a ten million dollar budget--it still couldn't touch it! The fifty calibre turrets in the Twelve O'Clock High sequence sort of set the tone for the rest, like the classic bar and the Battle of the Coral Sea/ Midway bit where they turn the planet into the wind and launch a carrier strike. Nearly every SF cliche gets a shellacking, and it's done with class. If Gene Roddenberry can stick pontoons on a UFO and call it a starship, Lucas can put big, shiny jet pods on everything! Even the toasters! The attention to detail is great, and keeps you wanting to go see it again, just to check if that was really Alan Shepard in a regulation NASA suit in the corner of the bar, or if those really were Schonherr's initials on the side of the desert scroungemobile. Are those guys really wearing Afrika Korps fatigue caps with Wehrmacht insignia and carrying Walther P-38's with movie projector lenses screwed on the muzzles? I wish they hadn't cut out that scene where all Luke's buddies go off wearing RAF sweaters to join the revolution, and the scene where the old man tells the kid about his father. Ahh, well...the farce be with you and abide by you and be gracious unto you...

Juggernought (not to be spelt with a "a", according to SFWA research with the British Admiralty.) Ignore the Ocean Liner bullshit. This is a straightforward EOD adventure, pretty well done, though the technology is out of date. The bomb experts in the film are using a voice intercom and tape recorder. Even on Kojak they use videotape. The devices themselves, while a class above the iron-pipe-and-match-head level, are at best WWII technology. Five-level RTTY tape, fer crine out loud!

Monty Python's Jabberwocky for those of you who have seen the Holy Hand Grenade, this whole movie can be summed up as two hours of "Bring out yer dead!" Unlike the Grailroad, they stay in medieval character, and there are no London Bobbies or parking meters. The scene in the palace armory, with slaves on treadmills and rampaging forty foot cogwheels right out of First Fandom, is a classic of Technology Gone Amok. The monster is a hybrid of Snodgrilla and something out of Sesame Street. Gory as hell.

Solaris This is the three hour abridged version, with English subtitles. Hard to follow, especially if you've read the book. The zeppelin has turned into a space-station-shaped non-space-station, and nobody ever mentions forty foot cogwheels running amok. RPN psychodrama. A.J. Budrys walked out in disgust, muttering in Russian, when the girl drank the liquid oxygen and her nipples stayed flaccid. I don't believe London in the distant future is going to look like Los Angeles with 1953 radio controlled Cheker cabs. The Northumberland DACHA on the ocean's surface was okay, though the Trekkies' Menagerie made the point better.

Creature from the Haunted Fakey monsters, Get Smart secret agents, and Cuban refugees screwing around in the Caribbean. Murder by toilet plunger. So bad it's good in a horribly campy way.

Logan's Run For Your Fugitive Life I saw this one in Nashville, and it was so horny out I had trouble paying attention. Neat little guns that shoot out BicButane flames. Jenny Agutter in the nude. A nice shot of a Belly Rave kid's slum/playground/reservation. Peter Ustinov with cracks in his face. I wonder who's going to do the bigname Guest Old Man in the next SF hit. They've already had Robinson, Guiness, and Ustinov. Would you believe Will Geer as Kimball Kinnison's rich uncle?

Cinderella Would you believe there are two X-rated cinderella parodies going around, one SF and one more or less SCA, and I went to the "wrong " one. Naked people and faked sex, as in Flesh Gordon. The Fairy Godmother was a black male? who did a Richard Pryor schtick, turning a watermelon into a coach and stealing hubcaps in the castle parking lot. Can you dig it?

A Bridge Too Far British military debacle in the tradition of Fort DuQuesne and Raglan's Light Brigade. Bloody Disaster. RPN anti-tank technology. I think the Rube Goldberg contraptions the British troopers under Sean Connery's command are firing at the Panzers are supposed to be captured Panzerflasken jobbies. What they look like is O.D. Moopsball launchers, or the infamous "Burpers" in Andre Norton's The Stars Are Ours. Bloop! Whizzzzzzzzz! Bloompfffp!

Space:1944--The Eagle Has Landed Good Nazis vs Bad Nazis vs American Rangers vs Churchill's double. Fake RPN paratroopers led by Oberlieutnant Alfie Caine Palmer. Jean Marsh upstairs with a hand grenade and Donald Sutherland downstairs imitating an IRA dropout. Jenny Agutter leaves most of her clothes on. A Wehrmacht E-boat gets stuck in the mud at low tide. Sutherland goes back to the peat bogs of the Emerald Isle to dig for Gelignite.

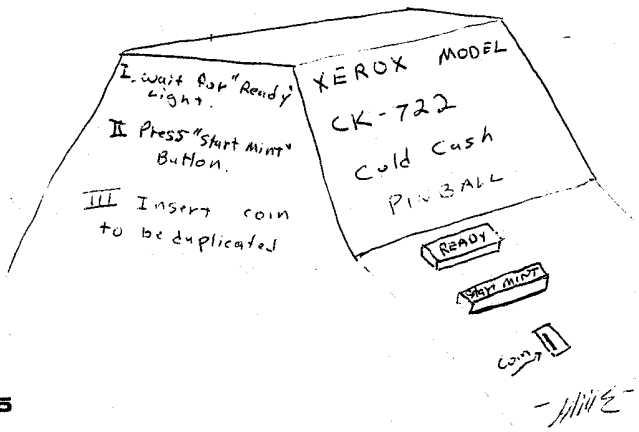
Stuff rumored to be coming up:

A Merlin movie based on Mary Stewart's Crystal Cave & Hollow Hills, supposedly with a screenplay by Harlan Ellison.

Bugs Bunny as a time traveller in A Connecticut Rabbit in King Arthur's Court. CBS gets even with Sam Clemens. Presumably, Daffy Duck wwill play Arthur, Sylvester; Modred, and Wile E. Coyote; Merlin. Special effects by the Acme Predator Enhancement Systems and Pyrotechnics Co., Inc. This could be the most moving and meaningful thing television has done since Magoo's Othello.

And then there's that on-again, off-again Disney SF opera. I hear that now SWAR is raking in the credits, they've thawed out Walt and Werner down in the vaults, and have gotten a go-ahead to proceed. Special effects on the only Systems/380 now working and on line.

Remember all those bad taste "Bionic Beagle" jokes back a year or two? Well, the Bionic Broad now has a K-9 friend, Rin Tin Can. I can hardly wait for the new January season, when they will introduce a new ethnic sitcom with fusion-powered ratroids roaming the ghetto.



NERTZ & BOLTS

LOOKS AT BOOKS

The Secret War by Gerald Pawle. This book is a must for people interested in the practical application of some of the more exotic areas of science and technology. It describes the efforts of the Directorate of Miscellaneous Weapons Development in England during WWII. These are the people responsible for the rocket-propelled grapnel used by British commando forces, the steam or compressed-air mortar used on many merchant marine ships plying the Channel, and the plastic protective plating. This last was bullet-proof armor placed around the bridge of merchant marine ships to shield them from airplane strafing attacks. It was made up of granite chips and mastic, and was as effective as steel armor, as well as being nonmagnetic. Besides that, it would hold a thumb tack! (Useful for holding up "Hitler Sits On Cucumbers" posters and other important propaganda--Ed.)

It is interesting to note that one famous science fiction author was an important member of the DMWD, namely Nevil Shute Norway. Whether this has anything to do with the book being so well written I don't know, but the author, a member of the group, covers what is basically a history with some skill.

The material in the book contains history, science, humor, and drama. It tells of great, complicated ideas that came to nothing, and of simple ideas that saved hundreds of lives and helped win the war. The main problem is that it was published in England in 1956, and thus may be hard to locate. The best place to look is in the library of your local college or university. The book is well worth the search.

All About Telescopes by Sam Brown, Edmund Scientific. Paperback or hardcover. XXX pages.

I explained why electronics was king technology among hobbyists a few Pyros ago. Mounting lenses in cardboard tubes seems somewhat pedestrian when you can be diddling bytes around in a microprocessor. And most college-level treatments of optics are several exponents drier than the Sahara on a hot afternoon. Still, it's a helluva field.

I got into optics the same way Jan Lippershey did-- by nolding two lenses lined up before my eyes and seeing Wonderful Things. I went from there to building a ten-inch telescope, all before I turned sixteen. I doubt I would have managed it were it not for the book named above.

What we have here is probably unique: an optics textbook written utterly from the point of view of the down-home basement tinkerer with a rusty hacksaw and a current Edmund Scientific catalog. Damn near every aspect of practical optics is covered here: mirror grinding & polishing, ray tracing, photographic systems, optical system calculating, erecting systems, prisms, filters, reticles, you name it. In addition, the treatment of sidereal time is the best I have ever seen.

The book is good probably because it is so damned visual. It's big (8 1/2 X 11) and at least sixty percent excellent drawings and diagrams. The diagrams present difficult concepts like virtual images, Gregorian foci, and German equatorial mountings in a crisp (if occasionally cornball) graphic allegory. Regardless of how dumb the little faces and cartoons may seem, they make the subject clear, and that, after all, is what I'm looking for. Brown is a master of clean, simple explanation of subtle concepts in everyday terms. He blends narrative and diagram exquisitely well.

Another thing that endeared the book to me was the way Brown outlines telescopes made out of junk. When you're fourteen, junk is eminently affordable, and frequently your only alternative. I actually did make telescopes out of used pipe fittings, deodorant cans, and caps from Joy detergent bottles. Furthermore, when a calculation was called for, Brown not only gave the formula but explained how to use it and worked a sample problem right there on the page. Marvelous.

For all the foofaraw we make about space travel these days, it's remarkable how few people have ever really looked at a star through a telescope. It's not the same as peering up through the Chicago haze into a pink streetlight tinged sky. Through a telescope a star is bright, and crisp, and has color. It's infinitely tiny and yet amazingly bright, surrounded by random throngs of its fainter fellows like diamond dust scattered across black velvet.

That's what optics is all about: creating an image from light which would otherwise go to waste, light which in some cases has traveled for millions of years to impact upon our small planet. All About Telescopes is the TTL Cookbook of hobbyist optics, rich with tables, formulae, hints, kinks, gadgets, ideas, and endless enthusiasm. No matter what your involvement in optics or astronomy, this book belongs on your bookshelf. Those living near Chicago can buy it at the American Science Center; others will have to order from Edmund. No matter. Get the most out of your eyes. Grab this book, some lenses, and start seeing.

BIODATA

MARK HYDE

At an early age I was pushed around a lot by young animals at a Catholic elementary school and so took refuge in science fiction and in science books, so as to learn the ways of getting even. Upon discovering the world of chemistry I started in things like black powder rockets, thermite, nitrogen triiodide, and succeeded in sending up self-destruct hydrogen balloons, mining several paths travelled by bullies, and subjecting most of junior to a tear gas attack. Moving from the puttering stage to the dangerous stage, I switched into electricity and worked up to where I could finish a 250 KV Tesla coil which could make impressive displays and wreck TV reception for miles.

This all had to be set aside when I joined the Navy to avoid becoming a draftee, and learned a lot of background electronics in becoming a radar operator, and have since been attracted to blinkies, beepers, and of course fandom.

My hobbies include general science, scuba diving, SCA, studying timber wolves, lasers, and basic tinkering. I have moved from being a bored serviceman who once had to explain the presence of flare launching pens, a coil of dynamite fuse, assorted elec tronic parts, an Army demolitions handbook, some embarrassing notebooks and a pocket radiation counter in his locker (after recently making several authorized simulated saboteur drills on other ships) and have just become another college science major who likes to have a good time.

I think I'll be among friends in General Technics.

(Damned right--I'll just have to remember not to steer my rowboat within twenty miles of you!--Ed.)

JOE'S EYES

BY STEVE JOHNSON

While working for Gould Labs this summer, I ran across an interesting little gadget, the infrared emitter-receiver couple. In a small plastic package, an infrared LED and a spectrum-matched phototransistor are encapsulated. The two common configurations have the emitter and detector pointing at one another (Fig. A) for interrupted-switching applications such as optical encoders;and parallel to one another (Fig. B) for reflective switching configurations such as proximity detectors. It was this latter configurations which caught my robot-builder's eye.

A number of transducers could be positioned around Joe's base-plate, enabling him (with the appropriate circuitry) to detect walls, kids, and low-flying zeppelins, and react accordingly. Another could be mounted on the front swivelling wheel to detect precipices and staircases which might otherwise cause harm to befall Joe. One could even be placed inside the trashcan door to detect the presence of a hand or other appendages.

(One problem which Steve seems to overlook is that the range of these things is very small. Xerox uses them in copiers to detect the presence of sheets of paper, and from personal experience I can attest that the reflecting object detected by a parallel pair must be within a fraction of an inch of the pair to reflect enough light to trigger the phototransistor. Not only that, but for a good solid detect signal the reflective object must be shiny at very least unless it's virtually on top of the parallel pair. Xerox uses tiny mirrors underneath the pair;a signal is generated when a white sheet of paper interrupts the light flow to and from the mirrors. That white piece of paper does not reflect enough light of itself to trigger the circuitry. Admittedly the sensitivity can be increased by following the detector with an op amp, but there remains the problem of motor coast. Joe and Cosmo use the same type of motors, and weigh about the same. When Cosmo is given a stop-signal, he continues to coast for almost six inches before he stops. When an eighty-pound robot hits something at 2 miles per hour, he hits it hard. With a maximum detect range of three quarters of an inch, that leaves five inches worth of coast room--plenty to bruise a shin or knock over a lamp. To ensure continued harmony between robot and environment, those detectors must be placed no closer to the robot than the robot's coast distance, presumably on flexible stalks which can easily bend against obstacles without damage while the robot coasts to a stop. I would also worry about noise light making Joe detect false obstacles that don't exist--one reason I am going the mechanical "whisker" route with Cosmo--Ed.)

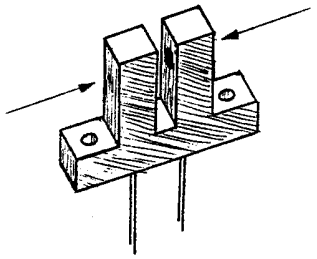


Fig. A

Interrupter Transducer

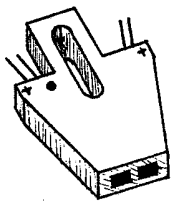


Fig. B

Reflective Transducer

How do you interface an infrared phototransistor with TTL or CMOS logic? Through analog circuitry (shudder) I'm afraid... According to manufacturer's specs, we can expect to get around .2 ma current to flow through the transistor when the LED is conducting 40 ma and a 90% reflective card is 1/2 inch from the transducer. To get 5 volts out of this for CMOS is no problem--an application of Ohm's Law will show that a dropping resistor connected to the output of the phototransitor will develop a potential across it proportional to the resistance and current through it. Thus, at .2 ma, a resistor of 25K ohms is necessary. Just to be on the safe side, let's use a 50K resistor in case our transducers are below spec and only put out .1 ma. The input impedance of the CMOS is so high that this will do nicely. TTL, on the other hand, is not so nice--some sort of buffer is necessary.

With the addition of an op amp buffer to interface to TTL, we have another problem to worry about, but only for a little while. The response time of the phototransistor is about 10 microseconds, and the op amp can handle 50 Khz with no trouble--so the response time is on the order of 30 microseconds, or around 30 Khz. This is a little fast, so we'll slow it down with a little capacitor to bring the response time down to about .1 sec. The circuit in fig. C accomplishes this.

We now have TTL or CMOS compatible proximity sensors for Joe. Now what? Computerization, of course. I've been looking into the IMSAI process control micro, and Jeff keeps telling me that the RCA COSMAC is the only way to go. I'm not sure which is better right now, but you can be sure that by Iguanacon Joe will no longer be just a painted up R/C trashcan.

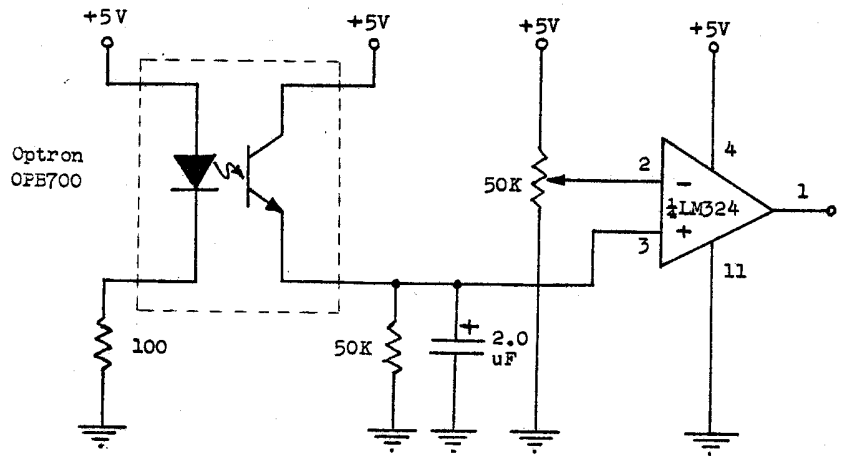


Fig. C

TTL Interface

IT MAY OR MAY NOT COME IN THE MAIL

-THOUGHTS ON PARTS

GUEST COLUMN BY AL DUESTER

(Editor's Note: The following column was sent to me damn near a year ago, along with a lot of other material. Somehow the letter got lost, and only when I was poking around under my workbench looking for some #10 wire for a balun did it come to light. My apologies to Al. The information here seems current, save that I don't think Altaj is still in business. So it goes.)

I've had some experience with mail-order suppliers, and since people have been askin' for it, here it is:

STAR-TRONICS Excellent service, with two weeks average order time. If you don't have this catalog, get it. They sell good quality stuff, and the catalog shows pictures of the stuff for sale. Bizarre but neat stuff, along with the usual transceivers, caps, semiconductors, resistors, etc. are to be found in their flyers. Address: Star-Tronics, PO Box 683, McMinnville, Oregon, 97128

ESM, B&F, ARIES Ever notice that these three places all have the same address? I don't suggest ordering from them because they take about three months to process your order at times. I haven't gotten any bad stuff from them, so if you've got the time...

DIGI-KEY Excellent service, three weeks average order time.

JAMES Good stuff, & a little over one week order time.

RADIO SHAFT I gotta tell ya?!?? Stay away unless you're desperate!! (I must step in here. The Shack's material has improved markedly over the last year or so. Since they've stopped packing CMOS chips in styrofoam, even the ICs are reliable. And let's face it, guys, they're all over the place. They've made IC's a supermarket item, available usually within twenty minutes until 9 or 9:30 at night. That can be handy. Even if your IMSAI blows its CPU, the Shack can supply. They always honor their warantee without question. If you bring in a bad IC with its package, they give you a new one. That's better treatment than a lot of mail places give you. And their all-American made Z80 computer is superb.--Ed.)

SD SALES Good results on both my orders. 2 weeks average order time.

POLY PAKS Order only if you like getting third-class hand-me-down garbage, like DIPs with all their little feet curled under them as though in the agony of a fiery death. I ordered from them four times, got screwed four times.

SOLID STATE SALES Average order time is four days! I've had good results on 5 orders, with no problems, but I had one guy who told me he got screwed. I order when speed is essential, and just for the sake of things like 35 amp SCRs.

DELTA Orders take a long time, and I got screwed twice. I only order if I'm desperate for transformers, because those seem to be good.

MESHNA From what I've heard from a friend who orders from them, most of their stuff is good, and they do have some really neat stuff now and then. Order time three to four weeks.

EDLIES Stay away! Much worse than Poly Paks or Delta.

ALTAJ Good results on both my orders. 2 weeks or less order time.

CIRCUITS SPECIALIST COMPANY (Semiconductor Supermarket) Excellent selection of stuff, and they have a wonderful catalog filled with all kinds of strange and fascinating ICs. They've also got a bunch of schematics and pinouts for a lot of these chips. Good stuff, with a little over 2 weeks order time. They're a little more expensive for your run-of-the-mill stuff, but they have stuff I've never heard of elsewhere. Address is: Circuit Specialists Company, Box 3047, Scottsdale AZ 85257

(I must continue to call Digi-Key and Advanced Microcomputer Products the two finest mail order electronics suppliers I have ever encountered. Both houses have a continually expanding selection of ICs at about the best prices going, and both ship very quickly, especially if you send money orders. You're a damned fool if you don't keep a current catalog from both places on file. Digi-Key even includes a business reply envelope for orders! Now that's first rate! Out of a combined total of about twenty-five orders, I have not gotten one bad component, one wrong component, nor failed to receive a fast refund for out-of-stock items. Keep them in mind for common ICs and computer parts. Both are a sure thing.--Ed.)

COSMO'S WHISKERS

Those of you who were at Windycon may recall a skeletal creature with an aluminum frame and a lot of toggle switches who could wiggle an arm, turn back and forth, and knock things over. His name was Cosmo, and at the GT party he had a sign taped over his tin cup reading: BLIND, DEAF, BUT SMART.

The sign only meant that Cosmo had a computer for a brain, but that he had no sense organs. Thus he had a bad habit of running into things, since he had no way to know if they were there.

This has got to stop. Elsewhere in this issue Steve gives his thoughts on IR photodetector pairs as robot eyes. I exercised my editorial option of butting in and explaining why I don't care for that system. I won't repeat myself. What I will do is outline Cosmo's sense system, now under construction. Cosmo may still be blind and deaf, but soon he will have an excellent sense of touch.

Call them "whiskers." They are actually loops of .025" hard steel piano wire, anchored to Cosmo's lower frame disk at both ends, and protruding away from his body about five inches. The diagram should make the arrangement clear. These wires are very springy, and will hold a position without deforming from touch. Soldered to the midpoints of all four loops are lengths of fine copper wire, which are fastened to the lower disk and kept taut by the tension of the piano wire loops. Each copper wire passes through the center of a short length of brass tubing without touching it. Both tubing and wire are fastened to a small plastic plate.

When the piano wire loops are fully extended and not deformed in any way, the thin copper wire will extend straight out from Cosmo's frame and will not contact the brass tubing. If something touches the loop, it will pull that copper wire a little bit in some direction. If the touch is more than just a brushing past, the wire will be pulled enough to contact the brass tubing. Zap! Contact with the outside world has been made.

Now, let's take a look at part of the COSMAC architecture. The CDP1802 CPU has four flags which are brought out of the package on four pins. These lines are normally held high by external pullup resistors. Each of the four lines has two specific branch instructions which test whether that line is at supply voltage or ground. It's possible to connect some sort of external switch to those flag lines, and thus test the switch directly to see if it has been actuated.

Now suppose that all four "whiskers" were connected to ground, and that each piece of brass tubing was connected to a flag line. You could test all four whiskers with just four opcodes, and then branch to an object avoidance subroutine if any of the flag lines was found to be at ground potential.

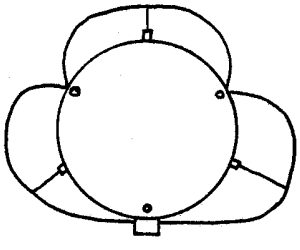
This will work just fine, but it's very wasteful of flag lines, which are a major feature of the COSMAC architecture. All of it can be done with just one flag line, and give you twelve spare sense inputs to boot. What it takes is a 4515 CMOS chip and a little software.

The 4515 is a 4-to-16 decoder, much like a 74C154 with a four-bit latch ahead of the decoder inputs. It can hold a four bit binary code and decode it to one of 16 separate outputs. The setup will work this way: All four whiskers are connected together, and then connected to one of the four flag lines on the CPU. The four pieces of brass tubing are connected separately to the first four outputs of the 4515. Now, the 4515 is an active-low decoder; the selected output is made low while all others remain high. If a selected output is connected to one of the brass tubes while the tube is in contact with the whisker, the whisker and the flag line will be pulled low. The CPU then "knows" that an object is touching the whisker whose number is given by the output line number on the 4515.

Right. It's confusing as hell. But it works. The computer treats the 4515 as an output port, and strobes a four bit code into the latch. One of the output lines is pulled low, and then the computer tests the whiskers to see if they are at a logical low. If the whiskers are high, the computer increments the number in the latch and tests the whiskers again. It can go around and around, testing all 16 output lines until it finds an output which pulls the whisker line low.

For the time being I'll only be using four of the 4515's outputs. The others can be added on at any time. The same software can test up to sixteen different sensors anywhere on Cosmo's body, and then use a lookup table to fetch an address to a subroutine which tells the CPU what to do about the sensed data. In the near future I will add a fifth sensor: a capacitive plate on Cosmo's "head" which will stop him dead in his tracks when someone touches the plate. Thus if I see him heading for an open manhole, (sensing for those is still under development) I can stop him quickly before disaster happens. Other senses? Who knows? Do you have any ideas compatible with this system?

(Postscript to this article: Since this was written the brass tubing sensors were tried and found to be wanting in touch sensitivity. The current plan is to use opto interrupters with a perforated slide between the optical elements. The slide will be attached to a wire soldered to the midpoint of a whisker. Deforming the whisker in any direction will move the slide between the optical elements, bringing a perforation into the IR beam path. The resultant detect signal will be cleaned up by an op amp comparator and used to pull the sense line low. Development of this system has been stalled by other pressing concerns; see QUARKS--Ed.)



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So much for covering my ass. I also put forward the above as proof that, yes, I could have gotten into law school had I so desired. It is also proof that legalese is as infectious as dandruff and about as hard to shake once you're through with it. On with the Policy Statement. The first section of Pyro is always a sort of an Editorial. It's generally me being biased about something for a few hundred words, and you can take it or leave it. I love a good argument and I'm always glad to print a rebuttal. Try to make it a reasonably intellegent rebuttal, tho; I hate to see someone make an ass of himself in print. I hold to a policy of printing virtually anything that I consider lively, entertaining reading. I will print even dull material if it has a strong technological theme. The only thing I absolutely refuse to permit in Pyro are intimations that space research and especially space travel are frivolous or wrong. If you think Man does not belong in space you are by definition a caveman and have no right to the fruits of modern civilization; kindly crawl back into your hole and become extinct.

Anything else, try me.

X a bunch of indeterminate

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I'm an all around computer nut, mad scientist, robot builder, etc. (nothing really unusual).

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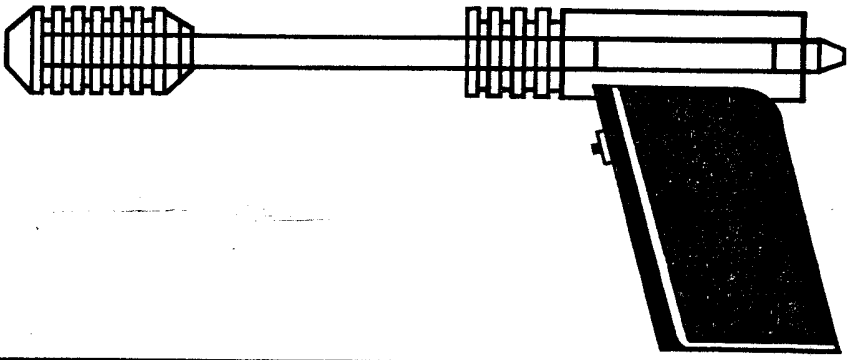
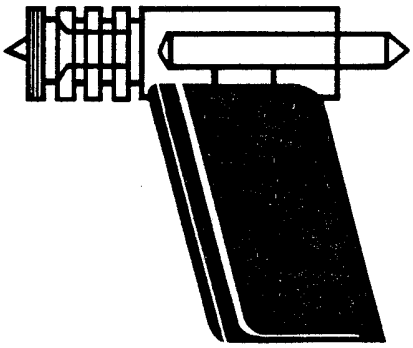
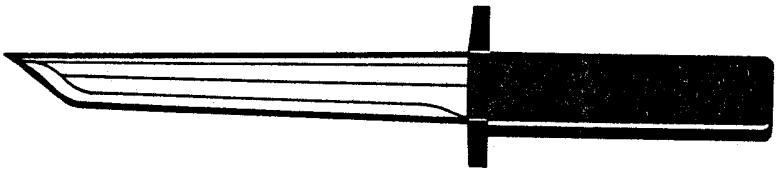
MODEL "A" This popular model saw action both as a sporting arm and as a reliable means of self defense. The long barrel length (6") and condenser allowed accurate fire at ranges up to 150 meters. In our replica, as in the original, the condenser may be removed for close-in work. Two 9 volt batteries (not included) are required.



MODEL "S" The model S was designed as a devastating short range weapon. Its dispersion cone spread the plasma beam so that at a range of 4 meters 2 men would be entirely covered. Small in size and easily concealed it was a favorite of agents and the underground. Two 9 volt batteries (not included) are required.



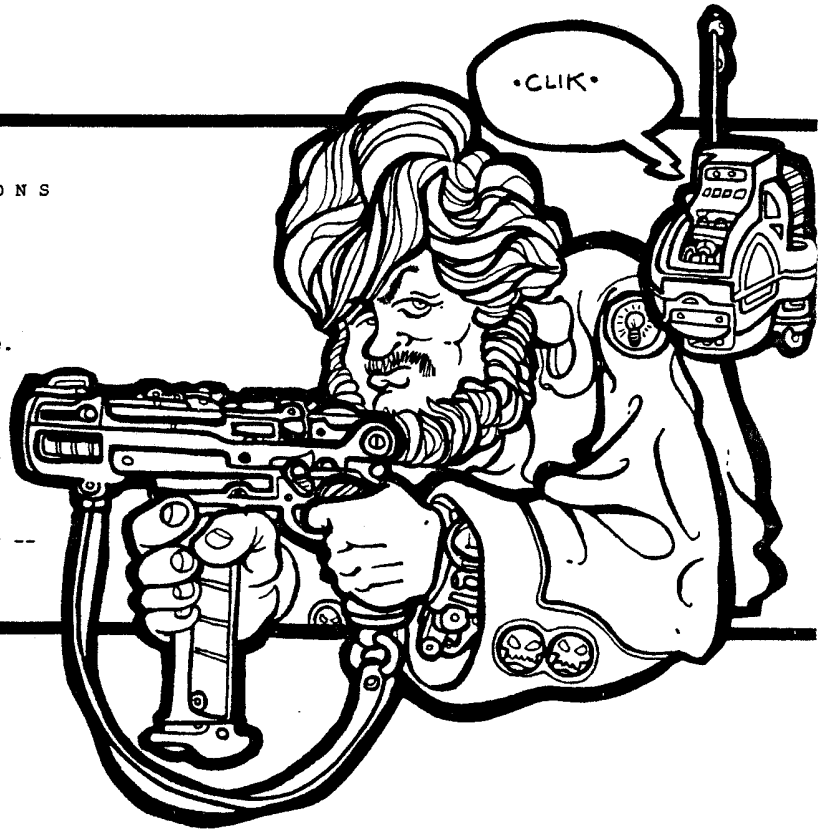
NEW A replica of the famous vibroblade is is now available. This deadly weapon later evolved into the light sabre and is the first to use contained energy fields. Used both as a tool and weapon it could cut through any material except neutronium. Our replicas feature a 7" acrylic blade and like the rest of our weapons produce the authentic flickering glow of the original. One alkaline 9 volt battery (not included) required.



R E P L I C A S * O F F A M O U S E N E R G Y W E A P O N S

In the 47th century, back on the planet Earth, some of the finest plasma weapons were developed. These were the famous PW series of which the model A and model S were the most popular. It was the sale of these guns by the weapon shops which helped to bring about the fall of the evil Isher empire. Now you too can own an authentic replica of these deadly weapons. Each gun is machined out of high quality acrylic plastic which closely approximates the neutronium used in the originals. When activated the weapons give off a bright, rapidly flickering glow which simulates the leakage of visual radiation through the neutronium when the plasma bursts are being discharged. The color of the discharge can be changed by simply replacing the light bulb. Replicas of other energy weapons can be custom manufactured to your order -- send us your specifications for a free quote.

Please add $2.50 for shipping per gun



*These guns are replicas and are not functioning weapons. They are constructed out of local materials as specified by Time Travel Commission Act 67951.

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Great Big Let's-Make-Up-For-Lost-Time-Issue!!!

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